PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Takayuki TAKAHAGI et al. Group Art Unit: 1793

Application No.: 10/576,976 Examiner: P. PARVINI

Filed: July 17, 2006 Docket No.: 127804

For: LIQUID COMPOSITION, MANUFACTURING METHOD THEREOF, LOW DIELECTRIC CONSTANT FILMS, ABRASIVE MATERIALS, AND ELECTRONIC COMPONENTS

DECLARATION UNDER 37 C.F.R. §1.132

I, Toshio Sakurai, a citizen of Japan, hereby declare and state:

1. I have a degree in Master of Engineering which was conferred upon me by Department of Synthetic Chemistry, Faculty of Engineering, KYUSHU UNIVERSITY in Fukuoka City, JAPAN in 1965.

2. I have been employed by Rorze Corporation since 2001 and I have had a total of 9 years of work and research experience in the development of engineering field.

3. My research work was announced at the 50th Spring Meeting, The Japan Society of Applied Physics and Related Societies and published Extended Abstracts, No.2 p.913 (2003)

4. I am a named inventor in the above-captioned patent application.

5. I and/or those under my direct supervision and control have conducted the following tests to compare the presently claimed dielectric film forming composition and the composition described in U.S. Patent Application Publication No. 2004/0040217 (Takashina) with respect to the capability of forming a dielectric film.

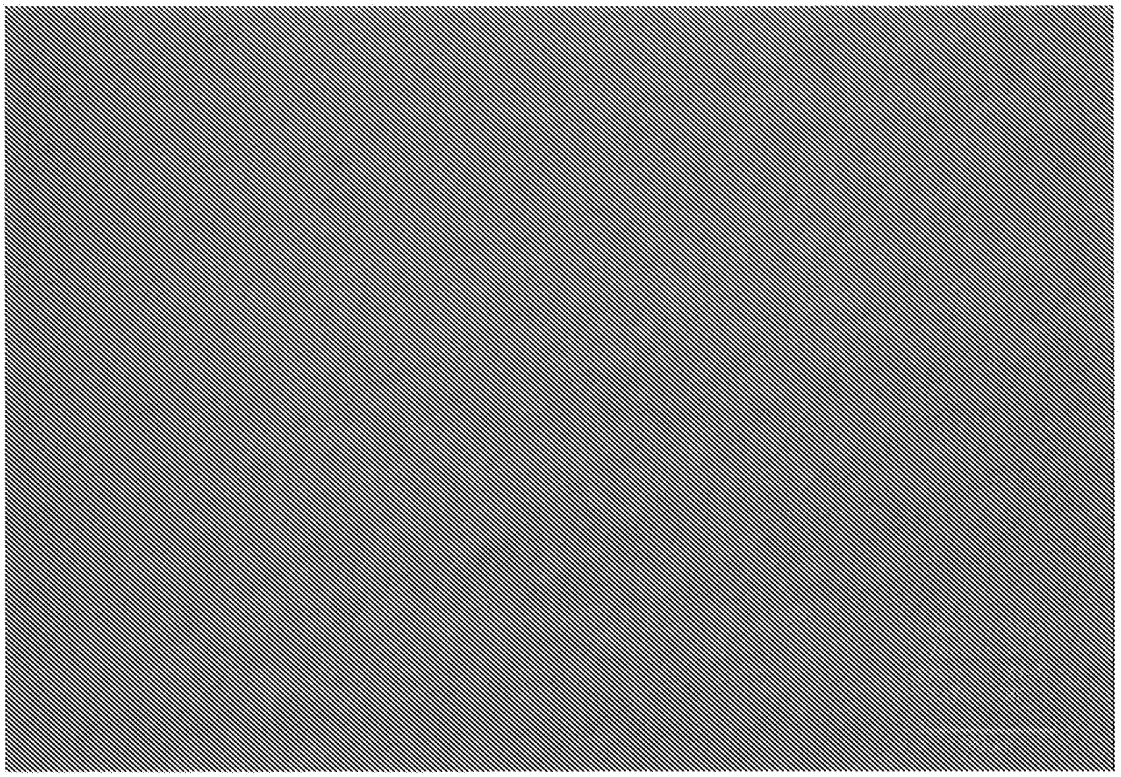
Experiment 1 (Present Application)

The liquid composition described in the Example 1 of the present application was produced.

Purified diamond fine particles were obtained as described in Example 1 of the specification. The purified diamond fine particles and water were charged in a quartz beaker so that the amount of the fine particles was 5 weight percent. "Polyethylene glycol 600" was added so that the amount is 1 weight percent, and the beaker was immersed in an ultrasonic water bath for 2 hours to obtain a viscous dispersion. 0.1 weight percent of dimethylamino ethanol was then added to obtain a black liquid composition.

The black liquid composition was dispersed in an ultrasonic bath for two hours, then applied on a silicon substrate using a commercial ink jet printer (Seiko Epson Co. Ltd. MJ-1000V2 type) at room temperature and then heated at 170°C for 30 minutes.

The thus obtained film was observed by an optical microscope (Olympus OLS3000) with an objective lens of a magnitude of 50 to obtain a microscopic image, which was electronically enlarged to obtain the following microscopic photograph having a magnitude of 1460.



The thus obtained film was also observed by eyes to prove that a uniform applied film showing rainbow colors was formed.

As shown in the above photograph, the uniformity was confirmed in the microscopic view, and no pinholes or cracks were observed.

The film was well adhered to the silicon substrate and was not peeled off from the substrate after the substrate was hit with a tiptoe or the film was rubbed with a finger.

The dielectric constant of the film was measured to be 2.5.

Experiment 2 (Takashina)

A liquid composition was prepared based on Example 1 of Takashina. However, the silica powder used in Takashina's Example 1 was replaced with crude diamond powder and the pH was adjusted using monoethanol amine instead of potassium hydroxide, in order to

prepare a composition with components more in line with the present application for the basis of comparison.

2.0 weight parts of crude diamond powder, 1.13 weight parts of monoethanol amine and 5.0 weight parts of pure water were mixed in a vessel. The content of the diamond powder was 24 weight percent with respect to the composition. The vessel was immersed in an ultrasonic bath and dispersed ultrasonically for 30 minutes. After 30 minutes, however, precipitates were deposited on the bottom of the vessel and the composition could not be uniformly dispersed.

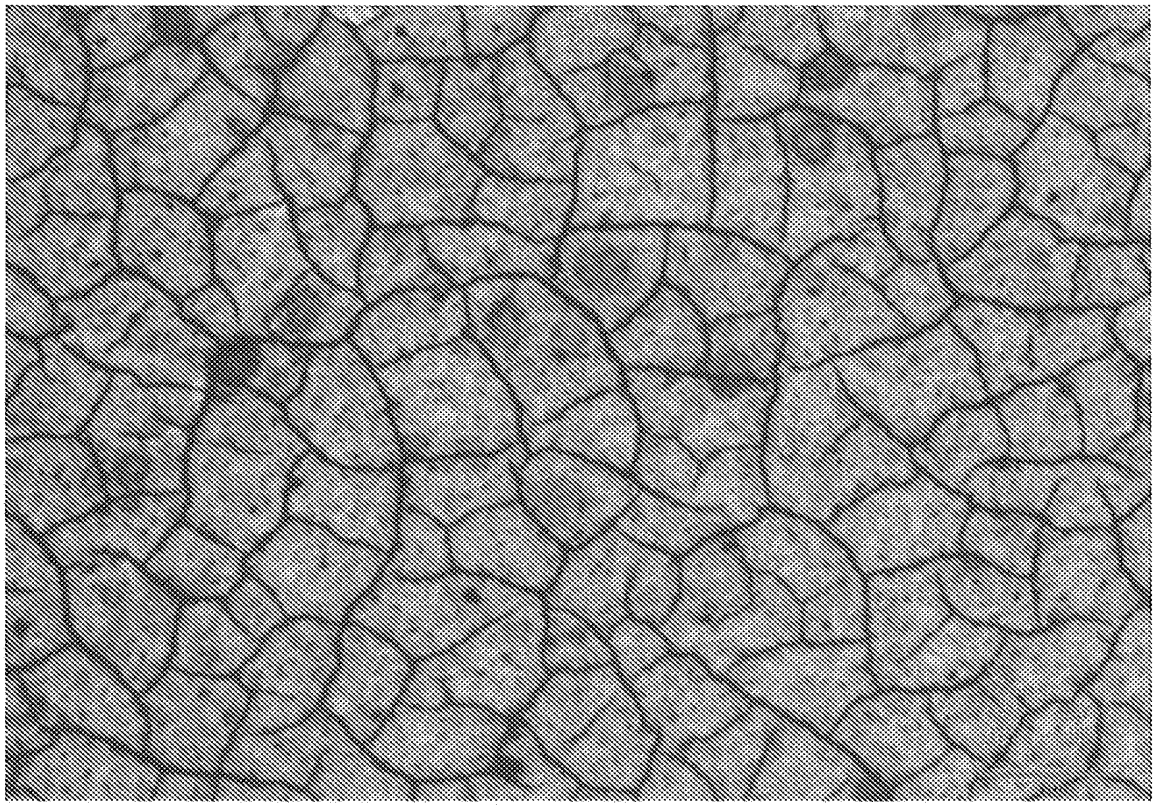
This experiment was thus terminated. The composition was clearly not capable of forming a dielectric film.

Experiment 3 (Takashina)

Experiment 3 was similar to Experiment 2, but 11.4 weight parts of water was further added to the composition and mixed using a glass rod. The thus obtained composition was further dispersed ultrasonically for two hours to obtain a viscous and gray liquid composition. The pH was adjusted to 11.0 as required in Takashina.

Then, the liquid composition was applied on a silicon substrate, adequately dried at the room temperature and heated at 170°C for 30 minutes to obtain a thin deposition of ochre color.

The thus obtained deposition was observed by an optical microscope (Olympus OLS3000) with an objective lens of a magnitude of 50 to obtain a microscopic image, which was electronically enlarged to obtain the following microscopic photograph having a magnitude of 1460.



As shown above, numerous cracks were generated continuously, forming a crack network over the whole of the deposition, and a uniform film was not obtained.

The deposition was not peeled off from the substrate after the substrate was hit with a tiptoe, but was peeled off to provide powder after the deposition was rubbed with a finger.

Discussion

The composition of Takashina is thus not capable of forming a dielectric film. Experiment 2 above did not achieve a dispersion that could form a film, and Experiment 3 above generated a non-uniform film with cracks over the whole of the deposition and that is easily peeled off from the silicon substrate. Neither Experiment 2 nor Experiment 3 achieved a film that functions as a dielectric film.

According to the Experiment 1, sulfo group and carboxyl group on the surface of the purified diamond particles are reacted with dimethylamino ethanol to progress the cutting of

absorption of the diamond particles and thereby to provide a stable aqueous composition. When the liquid composition is applied on a substrate and water is evaporated, the aggregation of the diamond particles in the applied film is prevented as the content of the diamond particles is increased over time. It is considered that the prevention of the aggregation of the diamond particles during the drying would prevent the cracks in the film and provide a uniform microstructure and adhesion onto the substrate.

According to the Experiments 2 and 3, it is considered that monoethanol amine functions only as a pH adjusting agent and does not react with the surface of the diamond particles. The diamond particles in the composition would be bonded to water molecules by hydration and absorbed with each other through the water molecules. The absorption of the diamond particles in the liquid would increase the viscosity of the composition.

According to the Experiment 2 where the content of the diamond particles is 24 weight percent as in Takashina, a uniform liquid composition was not obtained due to the aggregation and precipitation of the diamond particles.

When the liquid composition of the Experiment 3 having a content of diamond particles of 10 weight percent was applied on the silicon substrate and dried, the aggregation of the diamond particles through water molecules would be considerable. As water is evaporated and the content of the diamond particles is increased over time, cracks would be generated in areas where the aggregation of the diamond particles is relatively weak.

Based on the foregoing experiments, it is shown that Takashina does not describe a liquid composition for forming a dielectric film as required in the present claims.

6. I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine and/or imprisonment under Section 1001 of Title 18 of the United

States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing therefrom.

Date: September 17, 2010

Toshio Sakurai

Toshio Sakurai